

1. A method for the selective removal of material from the surface of a silicon-containing substrate for forming a deepening, comprising the steps of
 - applying a mask onto the substrate surface in accordance with the desired selective removal,
 - dry-etching the substrate, and
 - inductively coupling power into the etching medium during dry etching,

characterized in that

a metal, preferably aluminum, is used for forming the mask, and

the substrate is kept at a distance from the inductive coupling of at least two times, preferably at least three times, the mean free path length of the plasma atoms or of at least 8 cm.

2. The method according to claim 1, characterized in that the substrate is kept at a distance of at least 10 cm from the inductive coupling.
3. The method according to one or more of the preceding claims, characterized in that during etching the pressure is below 5 Pa, preferably below 3 Pa.
4. The method according to one or more of the preceding claims, characterized in that etching steps alternate with passivation steps for the side walls of the deepening.

5. The method according to one or more of the preceding claims, characterized in that material is removed up to a depth of at least 80 μm , preferably at least 300 μm .
6. The method according to one or more of the preceding claims, characterized in that material is removed up to the other side of the substrate.
7. The method according to one or more of the preceding claims, characterized in that a mask having a thickness of below 1.5 μm , preferably below 0.6 μm , is formed.
8. The method according to one or more of the preceding claims, characterized in that the substrate is masked up to the edge.
9. The method according to one or more of the preceding claims, characterized in that when the mask is applied the metal, preferably aluminum, is vapor-deposited or sputtered thereon.
10. The method according to one or more of the preceding claims, characterized in that when the mask is applied a metallic layer is etched in accordance with the desired selective removal.
11. The method according to one or more of the preceding claims, characterized in that the metal used contains at least 90 % by weight Al.
12. The method according to one or more of the preceding claims, characterized in that the etch position (T) is determined repeatedly in the depthwise direction,

etching being concluded or a second etching process which is qualitatively different or proceeds with operating parameters differing from the preceding etching process, being employed when a certain position has been reached.

13. The method according to one or more of the preceding claims, characterized in that the depth is determined by means of laser light whose properties are analyzed after being reflected by the bottom, in particular with respect to the first derivative of a detected signal.
14. The method according to claim 12 or 13, characterized in that in the second etching process etching is carried out in a dry condition with inductively power-coupled plasma, the gas pressure being higher and/or the applied bias being lower.
15. The method according to one or more of claims 12 to 14, characterized in that after the second etching process a third etching process is used which is qualitatively different from the preceding etching process or proceeds with operating parameters differing from the preceding one.
16. The method according to claim 15, characterized in that in the third etching process etching is carried out in a dry and isotropic condition and preferably with inductively power-coupled plasma, wherein the applied bias may be 0.
17. The method according to one or more of the preceding claims, characterized in that before the mask is

removed an incineration step for polymer residues on the mask is preferably provided by wet etching.

18. The method according to claim 17, characterized in that the incineration is effected by means of oxygen plasma.

19. The method according to claim 17 or 18, characterized in that the incineration is followed by a treatment with tetramethylammonium hydroxide.

20. The method according to one or more of the preceding claims, characterized by one or more of the following features:

- the material is removed from more than 8 %, preferably more than 20 %, of the substrate surface,
- the substrate is a disk-like wafer having a diameter of at least 10 cm, preferably at least 15 cm.

21. Use of aluminum or an aluminum alloy having at least 90 % by weight Al or a composite material having at least 90 % by weight Al as a masking material for substrates which are to be deep-etched in a dry condition using inductively power-coupled plasma.

22. A mask material for masking wafers to be etched, which contains aluminum,

characterized in that

the aluminum amount is more than 90 % by weight, preferably more than 95 % by weight, and

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a copper amount between 0.5 and 2 % by weight, preferably below 1 % by weight, and/or a silicon amount between 0.5 and 2 % by weight and/or a titanium amount between 0.2 % by weight and 3 % by weight, preferably below 1.5 % by weight, are admixed.

23. Wafer having a masking layer with a masking material according to claim 22.